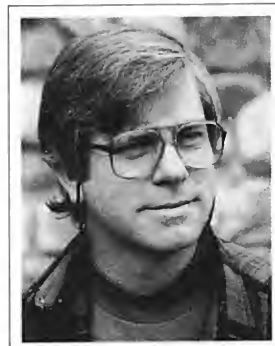


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LABORATORY EVALUATION: THE EFFICACY OF HEMI-SYNC FREQUENCIES



by F. Holmes Atwater

F. Holmes Atwater is coordinator of TMI's Brainmapping Project. A retired military officer, he has been a college instructor, scientific investigator, and behavioral engineer, and has completed graduate work in counseling psychology. His specialty is the design and application of techniques for cultivating propitious states of consciousness.

IN THIS ISSUE

TMI LABORATORY EVALUATION: THE EFFICACY OF HEMI-SYNC FREQUENCIES i

Hemi-Sync's ability to suppress resting-state-alpha and, consequently, support unique perceptual perspectives is the topic of this report by F. Holmes Atwater.

EFFECT OF HEMI-SYNC ON DENTAL ANXIETY iii

Christopher W. Beckner describes an informal, twenty-five-subject study employing Hemi-Sync to relieve apprehension during dental procedures.

To be effective, Hemi-Sync frequencies must promote more than simple changes in consciousness. Many stimuli can be used to change consciousness, but few are able to provide the participant with the opportunity for a transcendent experience or, as Bob Monroe says, a "different overview." All research conducted by the Institute is directed solely to the development of methods and techniques that will aid others in evolution and growth of human consciousness and perception. In accordance with this position the TMI Laboratory continually evaluates the effectiveness of the Hemi-Sync process. This includes the Hemi-Sync cassette tapes, Hemi-Sync formats used in TMI educational programs, special-application Hemi-Sync patterns, and the administration of the Hemi-Sync process in individual PREP sessions in the lab. As research progresses and technology permits, improved and/or special-purpose Hemi-Sync frequency combinations are developed and evaluated. With the advent of newly developed computer software, the TMI lab can now evaluate the efficacy of the Hemi-Sync process to a degree never before available.

Last year an independent psychophysiological study of the Hemi-Sync process was conducted to determine if the technique could enhance the induction of transcendent experiences. This study was conducted by The Colorado Association for Psychophysiological Research, 1013 Twin Sisters Road, Nederland, Colorado 80466. One of the findings of this study was that at baseline (an EEG recording taken before any stimulation) and during stimulation with pink noise, alpha brain-wave activity was confined to the cortex behind the Sylvian sulcus (back of the head). In the profession, this condition is known as "resting-state-alpha." As the Hemi-Sync stimulation began, this predominant alpha activity decreased and a flowing, dynamic pattern of EEG activity accompanied transcendent experiences in the subjects. The study concluded that binaural beat stimulation as presented in the Hemi-Sync process appeared to provoke progressive EEG activity accompanied by subjective reporting of transcendent experiences. Of interest here, in the following paragraphs, are the study's

findings of amplitude suppression of alpha in response to binaural Hemi-Sync stimulation.

Alpha suppression is being studied by researchers and therapists who use theta biofeedback as a component in the treatment of drug and alcohol abuse and obesity. These researchers believe that alpha suppression identifies or is required to "trigger" or "initiate" transcendent experiences. (Unpublished data reported independently by Ed Wilson, MD, and Fowler Jones, PhD.) Using a Neuromagnetometer and brain mapping with SQUID technology, researchers at New York University have been studying alpha suppression as well. They believe that regional alpha suppression may indicate access to thought processes. Over the last three years of the TMI Brainmapping Project, alpha suppression behind the Sylvian sulcus has been the most dependable indicator of an effective response to Hemi-Sync sound patterns. The Colorado Association for Psychophysiologic Research reports that *un-suppressed* alpha may be a stabilizing force, providing one with familiar modes of processing perceived data. Without the suppression of persistent resting-state-alpha one cannot obtain a different overview.

The characteristic EEG parameters of resting-state-alpha reveal the individual's temperament, the way in which the individual processes and interacts with the world he or she perceives. The EEG parameters of interest relate to frequency, amplitude, band width, and the level of dynamic activity. An individual with a static, medium to high frequency (9-11 Hz), high amplitude, narrow band resting-state-alpha relates to the perceived world differently than an individual with alternative parameters. These differences are testable using standardized profiles like the Meyers-Briggs Type Indicator (MBTI). The ability to modify resting-state-alpha directly affects one's experience of one's environment. If one moves toward an experience in an expanded state of consciousness and retains one's innate resting-state-alpha, one will relate to the perceptual environment of this experience equipped with one's familiar repertoire of acumen. As a result, the altered state experience lacks fidelity and depth of field and provides little insight. Alternatively, if one moves toward an experience in an expanded state of consciousness without one's innate resting-state-alpha, one will relate to the perceptual environment of this experience from a novel perspective. Changing one's resting-state-alpha effectively transforms one's perceptual venue.

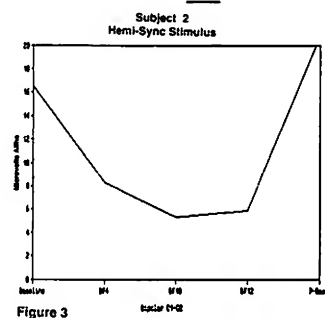
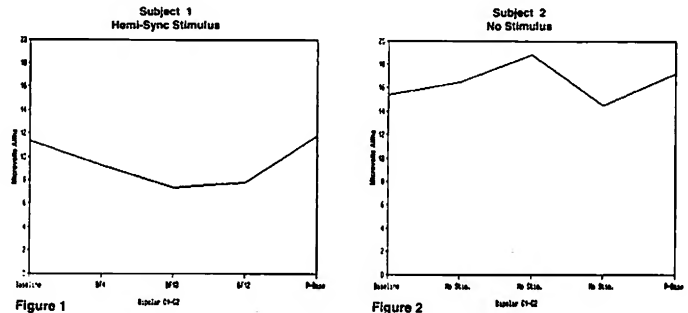
Amplitude suppression of resting-state-alpha is only one of the alterations that are possible with the Hemi-Sync process. The mixing of numbers of binaural beat frequencies generates an audioencephalographic interferometry effect which can be used to transform innate resting-state-alpha or reinforce beneficial alpha states. Some "Focus Level" Hemi-Sync frequencies used do not interfere with resting-state-alpha and allow the listener to integrate and relate to "tape experiences" in his or her everyday, familiar life. Other Hemi-Sync frequencies endeavor to alter resting-state-alpha to provide listeners with high-fidelity, rich "Focus Level" experiences and, ultimately, a different overview.

Following is an example of the research involved in the development of a new set of Hemi-Sync frequencies. A series of Hemi-Sync tones were assembled and were used as stimuli for experimental subjects. Brain waves were monitored using a 20-channel computerized EEG (Neurosearch-24, Lexicor, Boulder, Colorado). Figure 1 illustrates alpha brain-wave amplitude in microvolts for experimental Subject 1. Notice that exposure to the Hemi-Sync stimuli BF4, BF10, and BF12

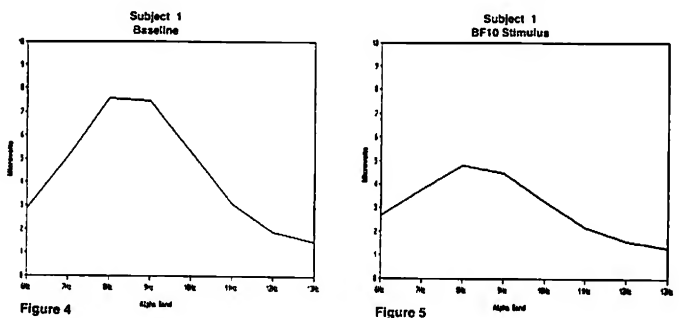
suppresses baseline or resting-state-alpha.

Many people have asked, from a research point of view, how we know that an individual's resting-state-alpha would not change anyway, without Hemi-Sync stimulus. Figure 2 illustrates alpha brain-wave amplitude in microvolts for experimental Subject 2. In this case, however, no Hemi-Sync stimulus was provided. As you can see, there is no suppression of resting-state-alpha.

For the next experiment we exposed Subject 2 to the same Hemi-Sync frequencies that were used for Subject 1. Figure 3 shows even greater suppression of resting-state-alpha during Subject 2's exposure to the Hemi-Sync stimuli BF4, BF10, and BF12.



As stated previously, amplitude suppression of resting-state-alpha is only one of the alterations that are possible with the Hemi-Sync process. Band width and frequency can also be affected. Figure 4 illustrates the baseline average amplitude in microvolts of Subject 1's resting-state-alpha. The graph shows a wide band, low frequency, moderate amplitude alpha pattern. Figure 5 illustrates the BF10 average amplitude in microvolts of Subject 1's Hemi-Sync state. This graph shows a wider band, lower frequency, lower amplitude alpha pattern



than that of baseline. Turning now to Subject 2, Figure 6 depicts the baseline average amplitude in microvolts of Subject 2's resting-state-alpha. Subject 2 has a higher frequency, higher amplitude resting-state-alpha pattern than does Subject 1. Figure 7 describes the BF10 average amplitude in

microvolts of Subject 2's Hemi-Sync state. This graph shows a very wide band, very low frequency, very low amplitude alpha pattern. Subject 2 seems to have been affected more profoundly than Subject 1 by the Hemi-Sync stimulus.

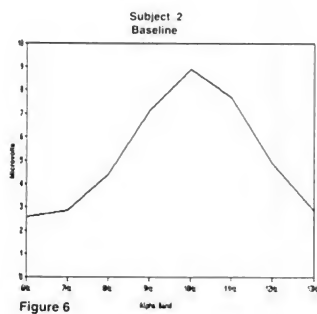


Figure 6

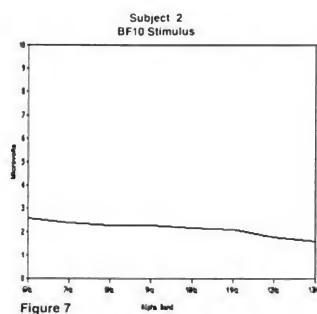


Figure 7

So whatever happened to hemispheric synchronization? The coined term "Hemi-Sync" has always been descriptive of coherent brain-wave activity in response to the Hemi-Sync binaural stimuli. New software just made available for the Neurosearch-24 enables direct measurement of this brain-wave synchrony. This information is available for biofeedback during a training session or for later analysis of brain-wave activity.

With reference to our two subjects mentioned above, Figure 8 depicts a rise in the percent of brain-wave synchrony from that of baseline when Subject 1 is exposed to the Hemi-Sync stimuli. Curiously, the percent of brain-wave synchrony remains high during the postbaseline period. Reviewing Figure 1, Subject 1's resting-state-alpha returns during postbaseline. This paradox was evident in the behavior of Subject 1 immediately after the experiment. The subject appeared slightly disoriented or "ungrounded," as the saying goes around here. Within a few minutes, physical activity restored the subject's normal orientation. Left undisturbed, the subject would probably have drifted off to sleep.

Figure 9 shows the rise in the percentage of brain-wave synchrony from that of baseline when Subject 2 is exposed to the Hemi-Sync stimuli. In this case the percentage of brain-wave synchrony diminishes when the Hemi-Sync stimulus stops. Compare the inverse congruence of Figure 3 and Figure 9. This subject moves from normal waking consciousness (resting-state-alpha) into a high-fidelity, rich experience in an expanded state of consciousness and returns well "grounded," ready to participate in Focus 1 activities.

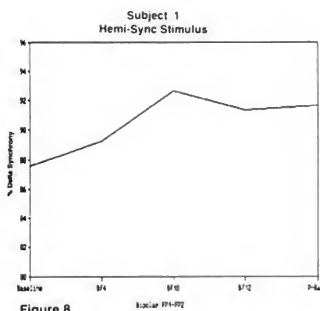


Figure 8

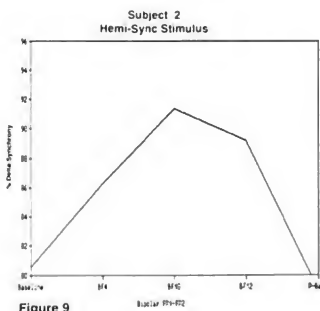


Figure 9

The Hemi-Sync process promotes more than simple changes in consciousness. Hemi-Sync provides the opportunity for a transcendent experience, an escapade beyond the narrow confines of familiar knowledge.



EFFECT OF HEMI-SYNC ON DENTAL ANXIETY



by
Christopher W. Beckner, DDS

Chris Beckner is a dentist in private practice in Hamilton, Ohio, specializing in periodontics, the treatment of gum diseases. He is also a certified hypnotherapist who uses hypnosis with dental treatment to promote patient relaxation. Dr. Beckner has just completed his first book, titled It's All in the Mind: A Guide to Happy and Healthy Living.

As a dentist, I am interested in providing the best possible healthcare for patients. As a hypnotherapist, I would like to teach people how to relax. Unfortunately, for many individuals relaxation and the dental visit are mutually exclusive concepts. Because of this, I continually look for ways to make the dental appointment less traumatic. If I can achieve this, my patients will be happier and my day will unfold much more smoothly.

One of the greatest stressors for the dentist is the fearful patient. Patient anxiety has posed a problem for both dentist and patient for many years. Researchers estimate that more than fifty percent of the population is not receiving regular dental care. Fear of the dental visit is a significant factor. Even many of the patients who visit the dentist regularly have at least some degree of apprehension. Therefore, I am interested in evaluating any noninvasive tools which may help reduce patient anxiety.

The purpose of this study was to observe and evaluate the effects of a Hemi-Sync tape on patient anxiety during dental treatment.

For this purpose, I selected the *Sleeping Through the Rain* tape from the *METAMUSIC ARTIST* series for several reasons. First, the tape contains no verbalization, just music. While a verbally guided tape is fine in most situations, I felt it might be difficult to coordinate a forty-five-minute guided relaxation exercise with a thirty-minute appointment. Second, the low bass tones in *Sleeping Through the Rain* are excellent for drowning out the sound of the dental equipment, such as the handpiece, ultrasonic scaler, and suction machine. Third, it is my favorite *METAMUSIC* tape and I could recommend it highly. The musical composition is particularly relaxing, and the Hemi-Sync frequencies integrated within the music are designed to lead the listener into a deeply relaxed state.

During a five-month period, thirty patients were given the opportunity to use the Hemi-Sync tape during their appointments. I selected as potential subjects those patients I perceived to be comfortable with or receptive to the use of headphones. Teenagers and young adults (who presumably

were familiar with using headphones) seldom hesitated to participate, while many older adults declined. To the patients invited to participate I explained that I was conducting research to test the effects of music on the experience of the dental visit. Details about the Hemi-Sync technology were not shared unless the patient specifically expressed a desire to know them. Of the thirty patients asked, twenty-five chose to participate in the study and five declined. It is interesting to note that three or four of those who declined to use the tape tended to be extremely tense and anxious during their appointments. These people wanted to remain fully alert and "in control" during the procedure, and apparently feared that becoming too relaxed might prevent it. One or two of these five patients, however, were able to relax on their own.

The treatment performed with the twenty-five subjects was either periodontal scaling and root planing or periodontal surgery. Both procedures are done with a local anesthetic. Appointments lasted from one-half to two hours. It was rarely necessary to use any pharmacologic form of sedation, although occasionally nitrous oxide (laughing gas) was used.

Following their appointments, each of the twenty-five subjects was asked to give his or her subjective opinion and impression about the tape. I recorded my observations of each patient's behavior during treatment.

While responses naturally varied from one person to the next, the results can be loosely divided into three categories: (1) patients who experienced their attention being distracted from the procedure; (2) patients who experienced deep relaxation; and (3) patients who experienced neither distraction nor relaxation.

Category 1 primarily experienced distraction. This was the largest group, with twelve patients. They reported enjoying the tape because it allowed them to focus their attention elsewhere while their mouths were being worked on. Comments included that the tape "helped to take my mind off the treatment," and that it helped to cover the sounds of the dental instruments. My observations of this group in general were that they appeared fairly relaxed and would alternate between having their eyes open and eyes shut during the appointment.

Category 2 primarily experienced deep relaxation. The eight patients in this group reported enjoying the tape tremendously, describing it as "very relaxing" and "a pleasure to listen to." They stated often that they loved the music and were outspoken in their praise of it. Two or three patients commented that the music sounded ethereal, two patients fell asleep during the procedure, and two or three patients stated that the tape evoked emotions, although they did not elaborate on the content. I observed that in general this group remained physically relaxed during the entire treatment and often kept their eyes shut throughout the appointment.

Category 3 experienced no apparent effect. Comments from the five patients in this group included that the tape was "too boring" or "all right." Most of the patients switched to the radio; two, in their early teens, never bothered to listen to the tape at all. Two patients stated that they thought the tape would be of more help to those who were nervous about coming to the dentist. Two patients kept their eyes open throughout the procedure and their bodies often remained tense. They stated that the tape didn't make any difference one way or the other.

There are two primary ways that patients can effectively cope with the experience of dental treatment—relaxation and distraction. People who have learned to relax and distract themselves have a distinct advantage in dealing with some of

the less pleasant aspects of life.

In my experience as a dentist, I have noticed that only about twenty percent of my patients have cultivated effective relaxation or distraction techniques which, when used during dental procedures, appear to promote relaxation and comfort. The remaining eighty percent continue to demonstrate or express some degree of tension and anxiety. In this informal study of twenty-five patients, the reverse occurred: eighty percent reported feeling relaxed or distracted with the tape, and only twenty percent reported no effect. My observations of their behavior corroborate their subjective statements.

Although I am not attempting to draw any conclusions from the results of this study, it is clear that the use of the Hemi-Sync tape had some positive impact on the experience of dental treatment.

Recently, I had some dental work done, and, having not had dental treatment for quite some time, I must admit it was very enlightening. Suddenly, I was the patient. The procedure itself was painless. I knew exactly what was being done and was not particularly nervous. Also, I am fairly adept at relaxation and self-hypnosis techniques. Nevertheless, I found it difficult to relax and, without a tape to listen to, I was on my own. As I attempted to concentrate on relaxing my body, my attention was drawn to the sound of the drill and the work being done on my tooth. Thinking to myself "This *is* a challenge to relax in the dental chair," I would have given anything to be "sleeping through the rain."

I will continue to offer the tape to patients in the future, and fully intend to take my headphones with me to my next appointment.



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